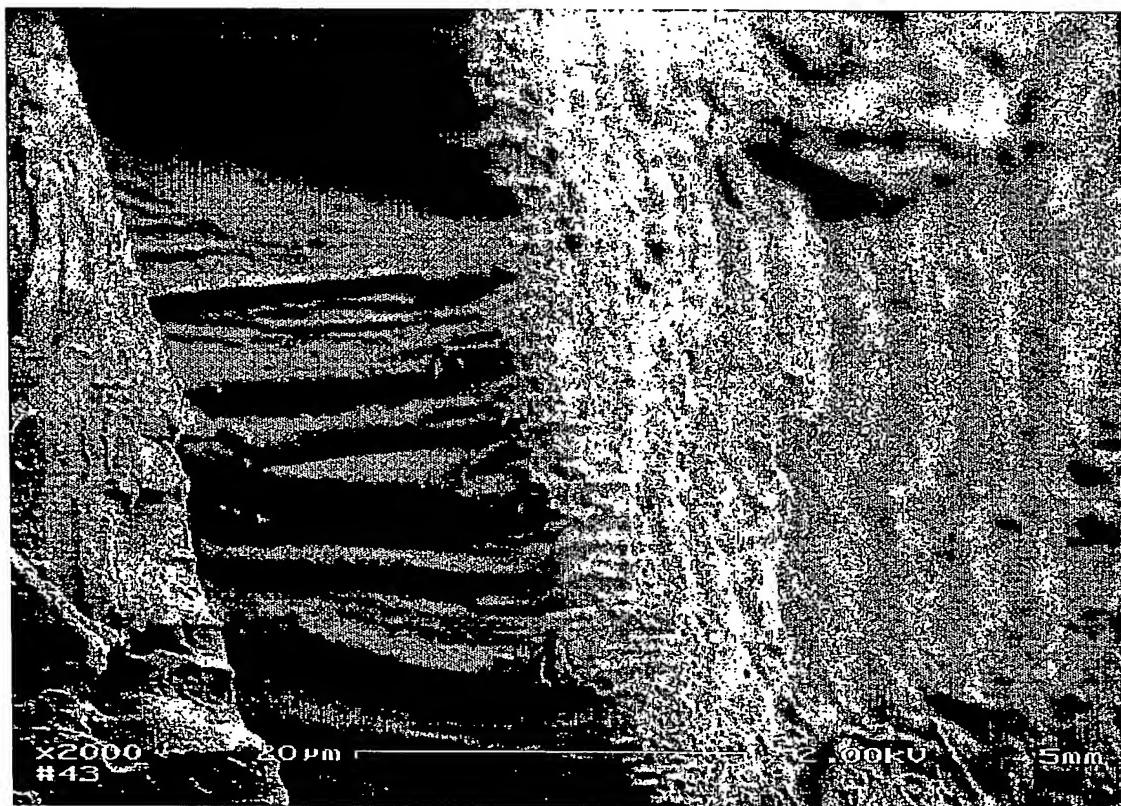


WO 2004/041845

10/533611  
Rec'd PCT/PTO 29 APR 2005  
PCT/US2003/034684

1/33

Figure 1



BEST AVAILABLE COPY

10/533611

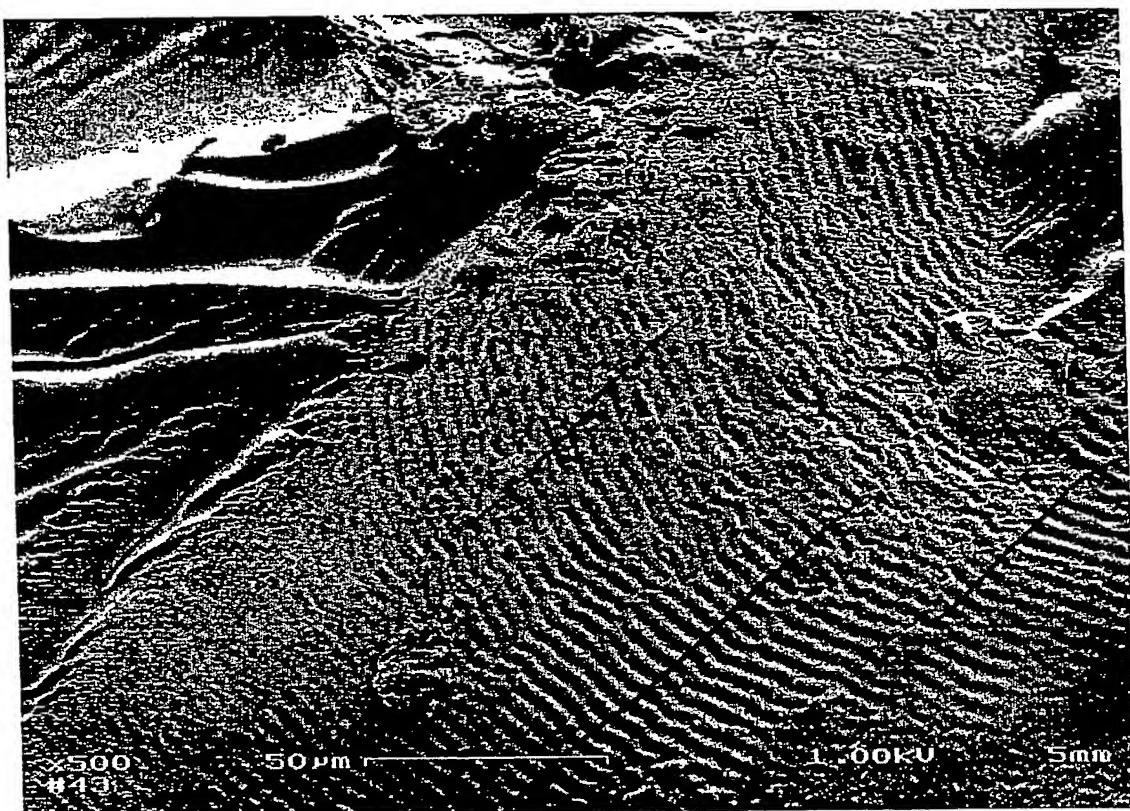
WO 2004/041845

PCT/US2003/034684

2/33

REC'D PCT/PTO 29 APR 2005

Figure 2



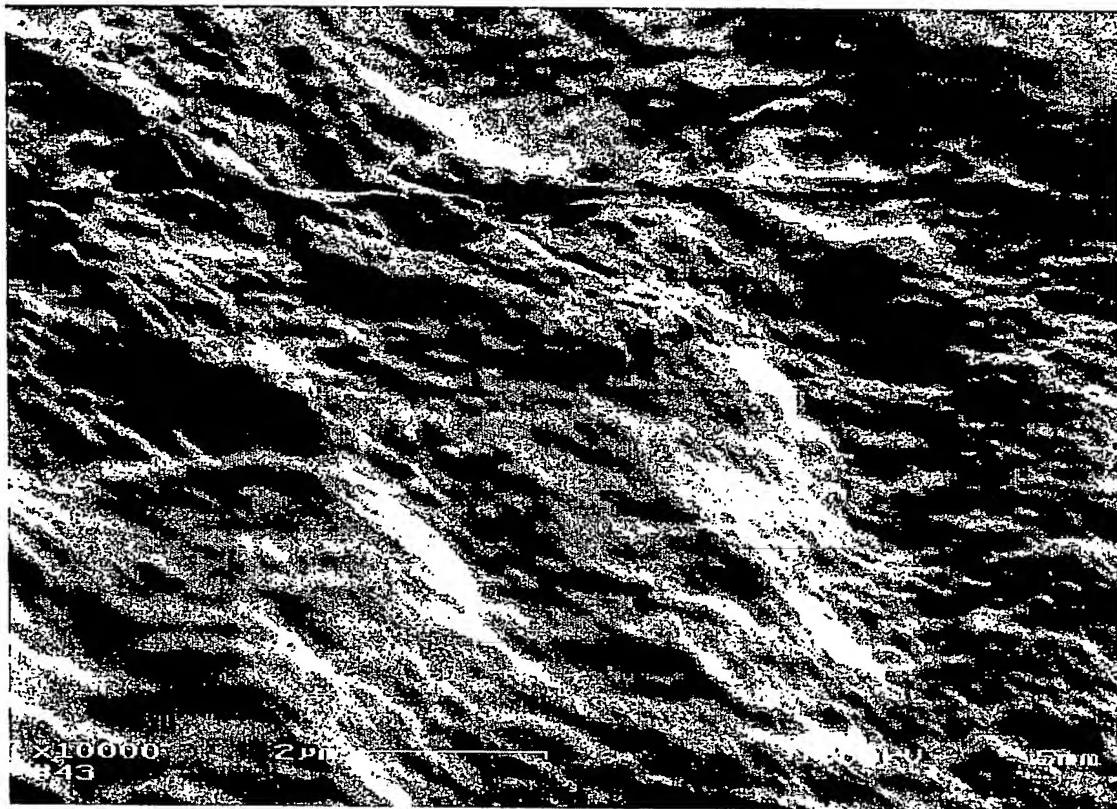
10/533611

WO 2004/041845

PCT/US2004/024684  
Rec'd PCT/PTO 29 APR 2005

3/33

Figure 3



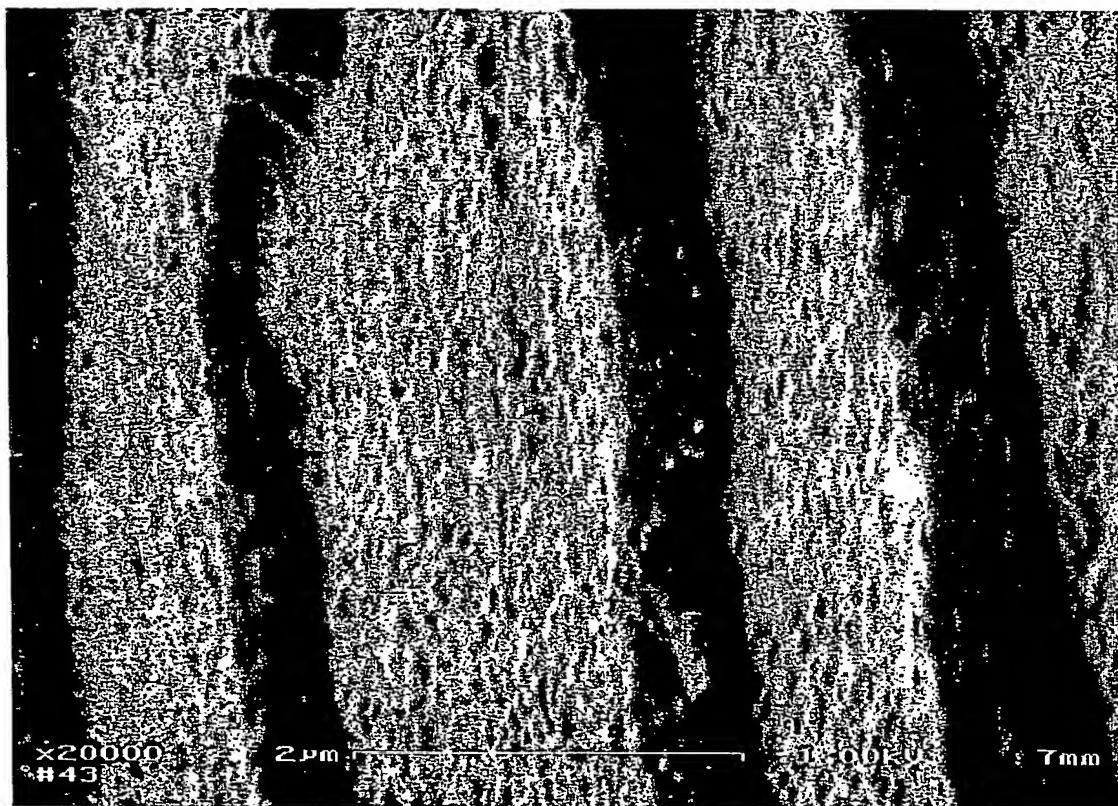
1075336411

WO 2004/041845

PCT/US2003/034684

4/33

**Figure 4**



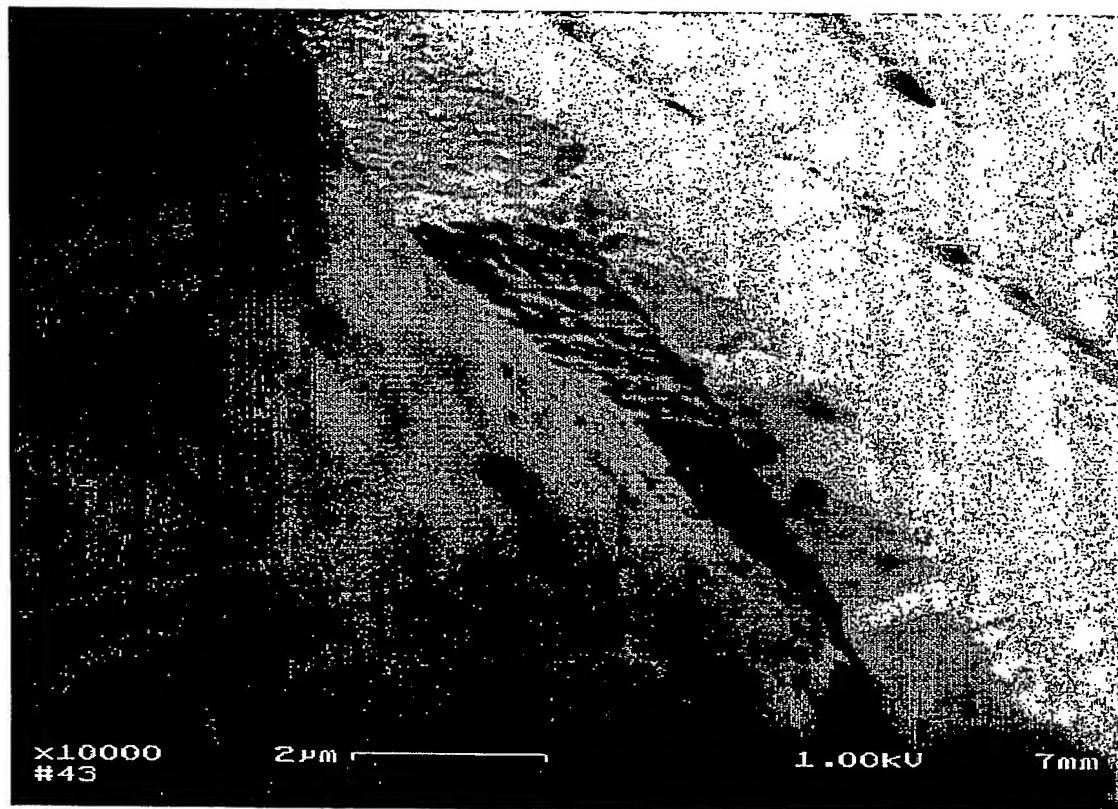
10/533611

WO 2004/041845

Rec'd PCT/PTO 29 APR 2005  
PCT US2003034684

5/33

Figure 5



10/533611

PCT/US2003/034684

WO 2004/041845

6/33

**Figure 6**



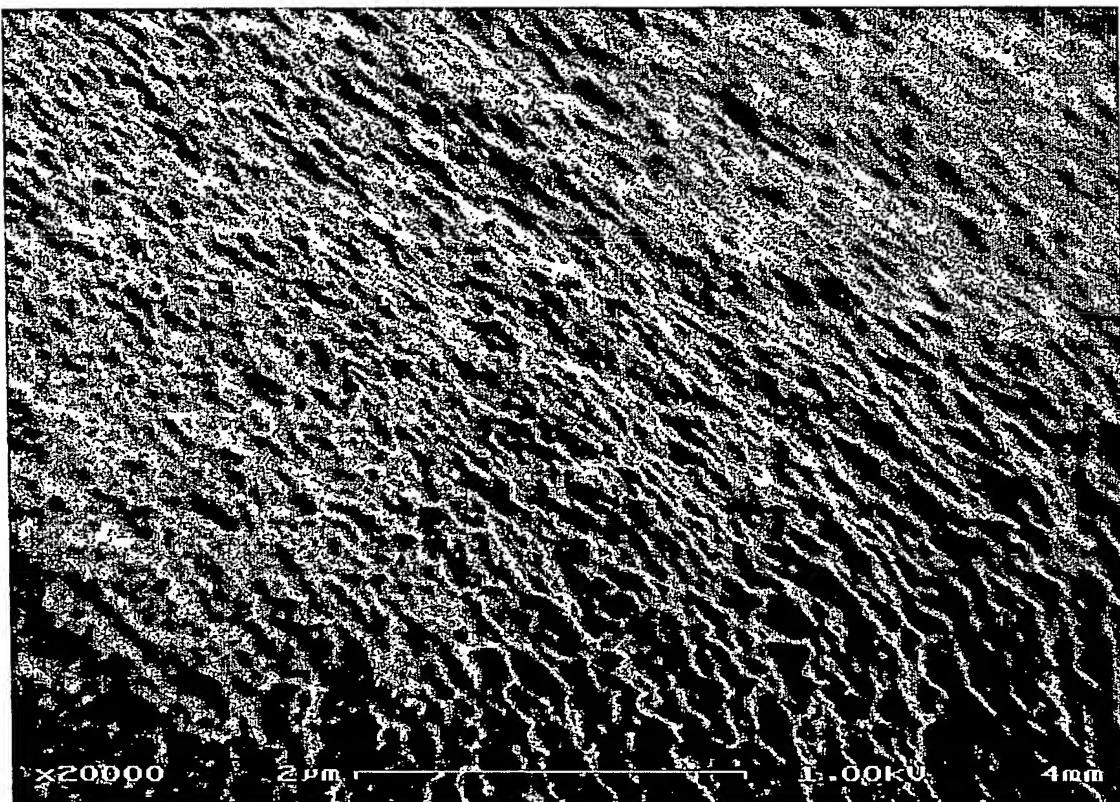
10/533611

WO 2004/041845

PCT/US2003/034684

7/33

Figure 7



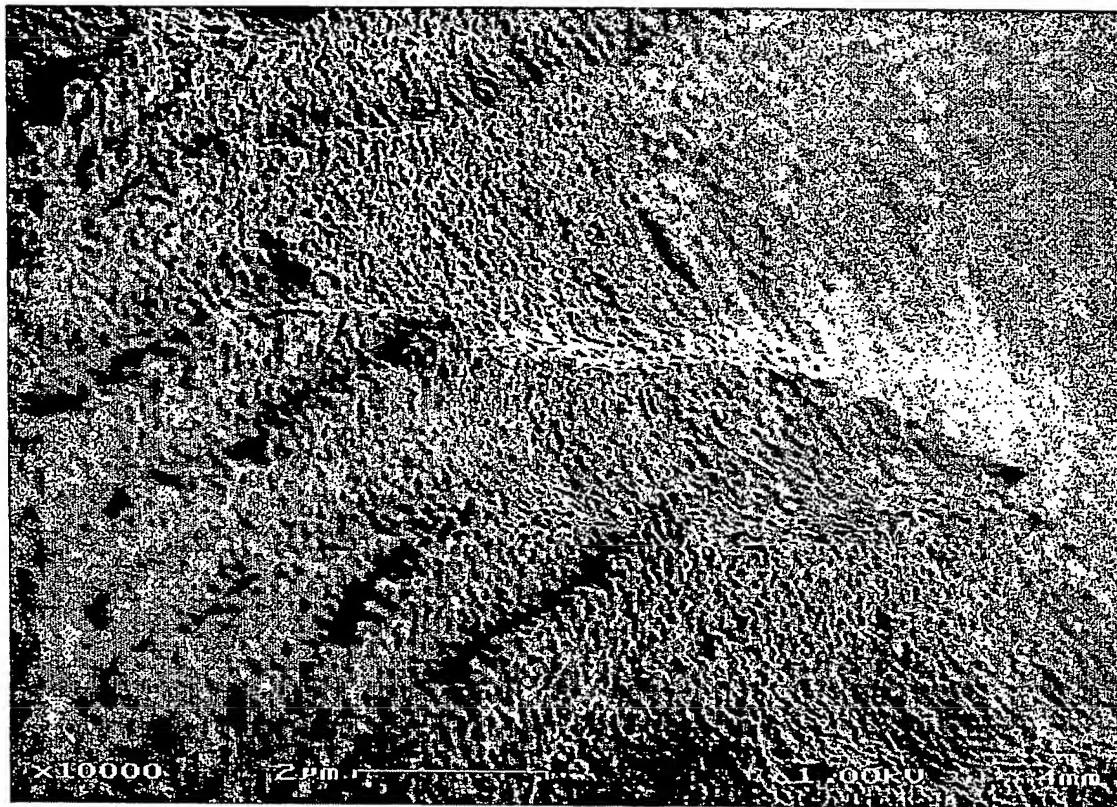
10/533611

PCT/US2003/034684

WO 2004/041845

8/33

**Figure 8**



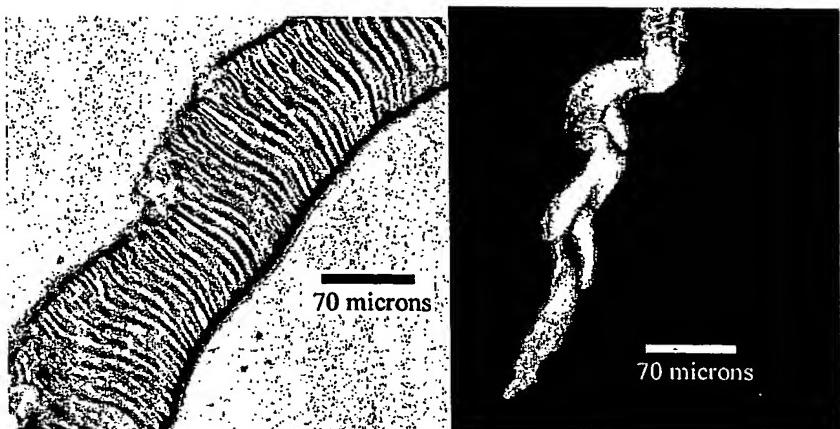
10/533611

WO 2004/041845

PCT/US2003/034684

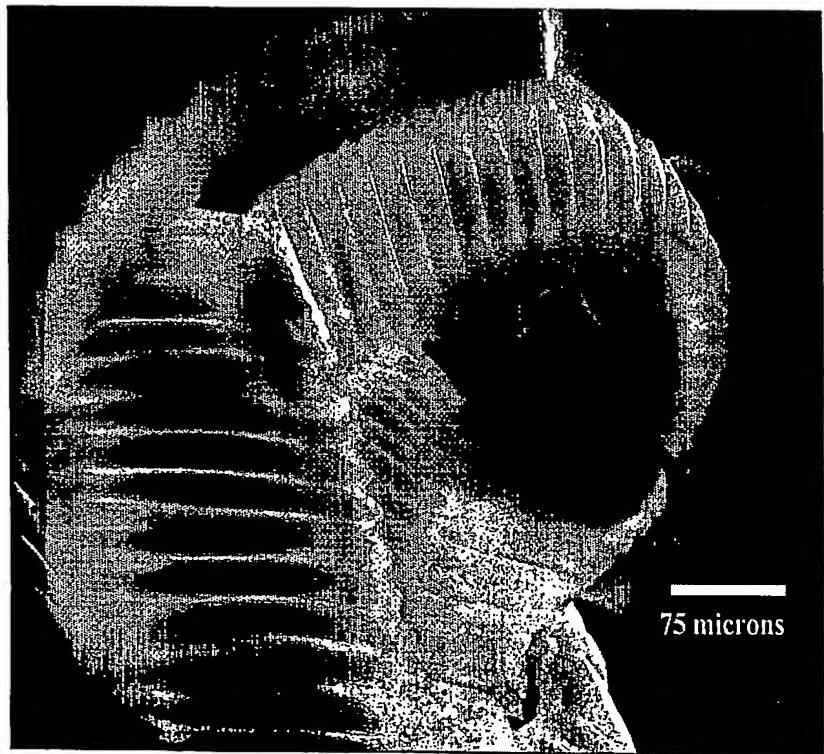
9/33

**Figure 9**



1

2



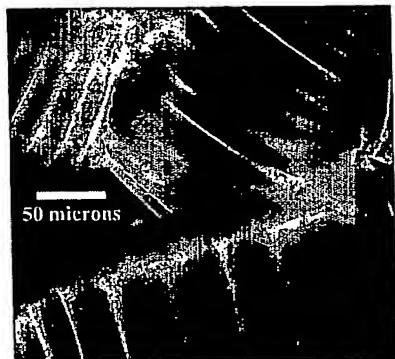
10/533611

PCT/US2003/034684

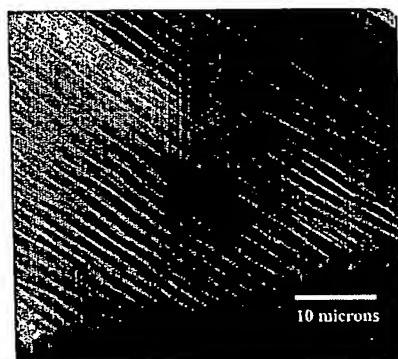
WO 2004/041845

10/33

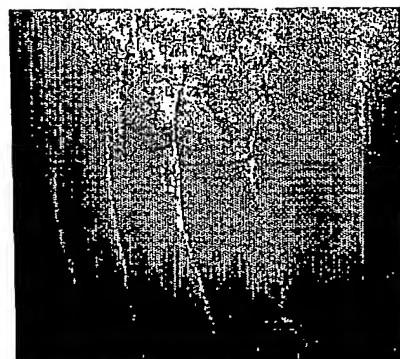
**Figure 10**



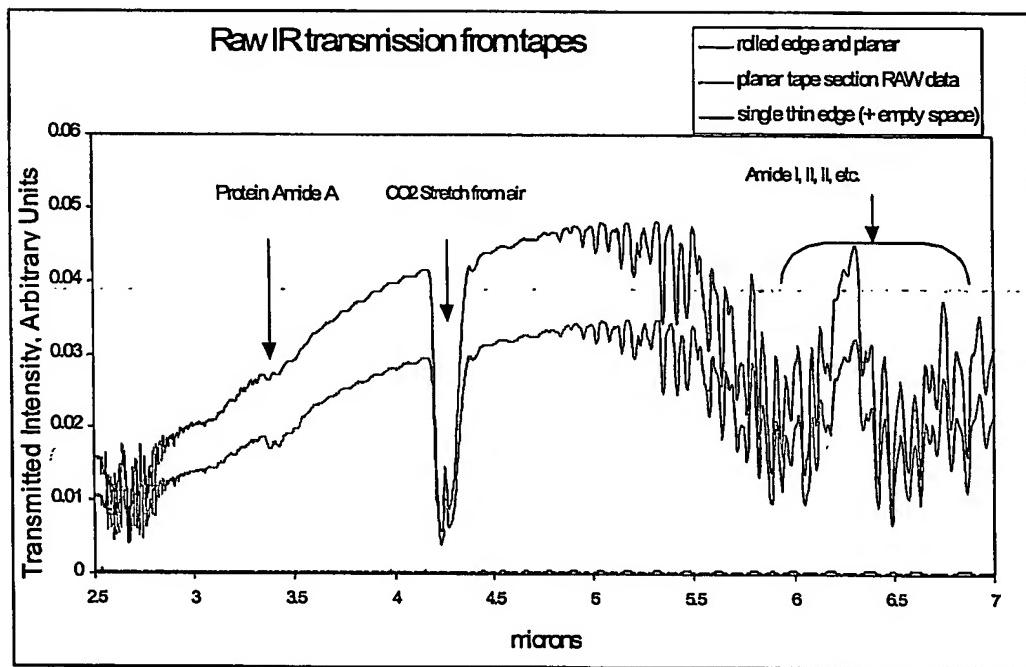
1



2



3

**Figure 11**

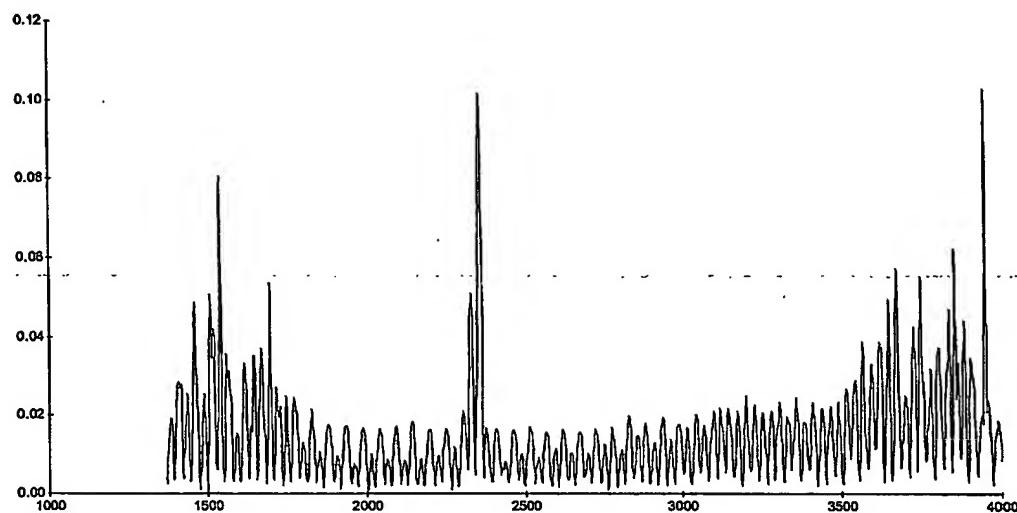
101553611

WO 2004/041845

PCT/US2003/034684

12/33

**Figure 12**



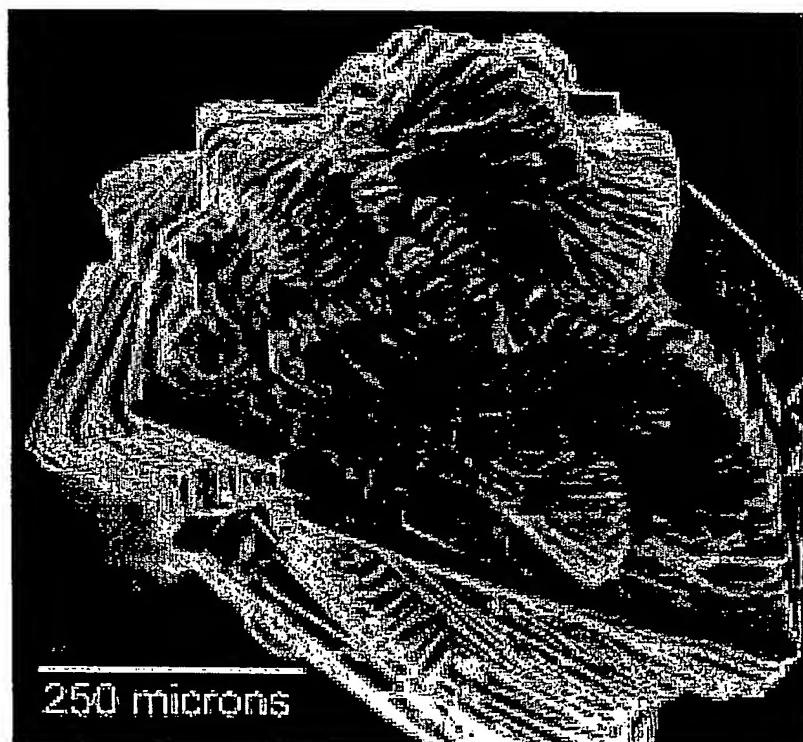
10/533611

WO 2004/041845

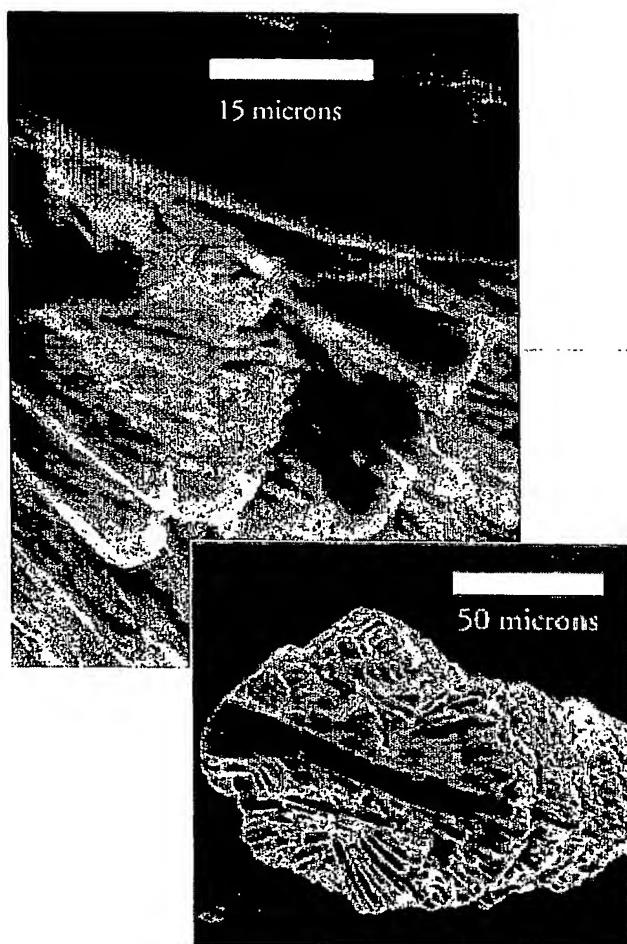
PCT/US2003/034684

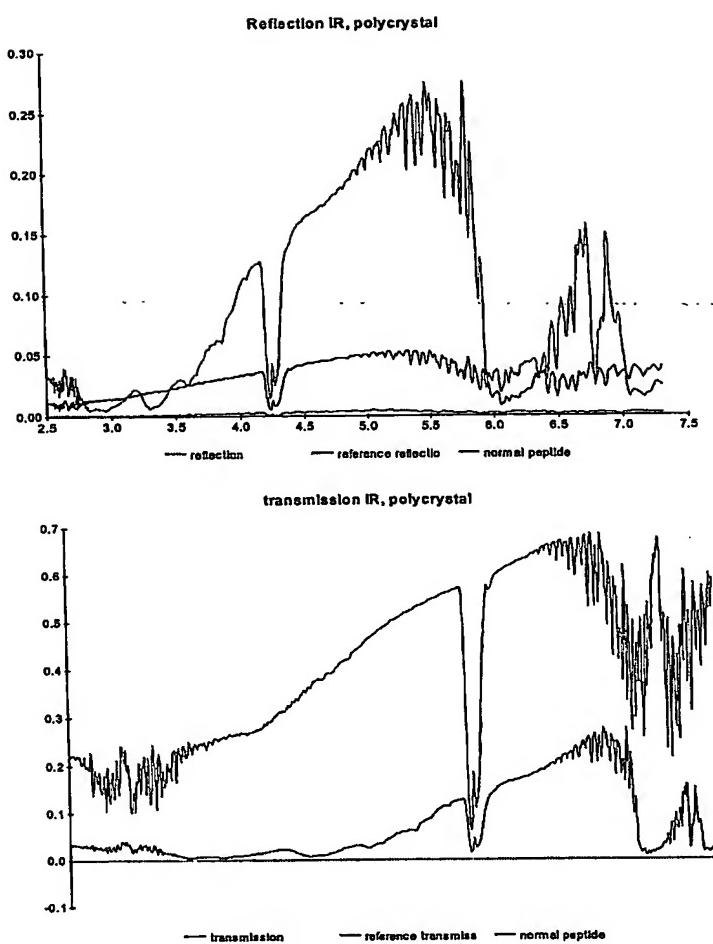
13/33

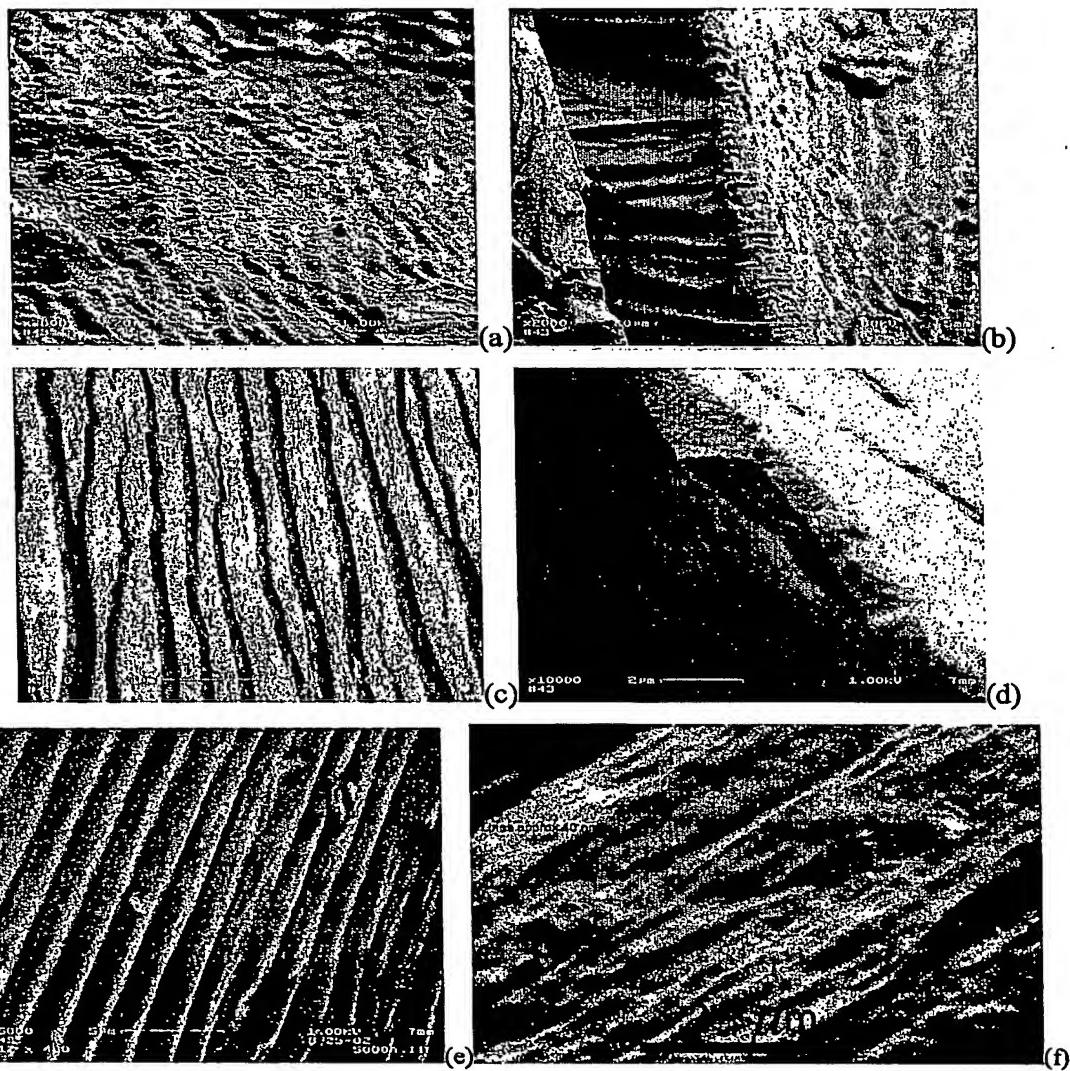
**Figure 13**



**Figure 14**



**Figure 15**

**Figure 16**

10/533611

WO 2004/041845

PCT/US2003/034684

17/33

**Figure 17**



**Figure 18**



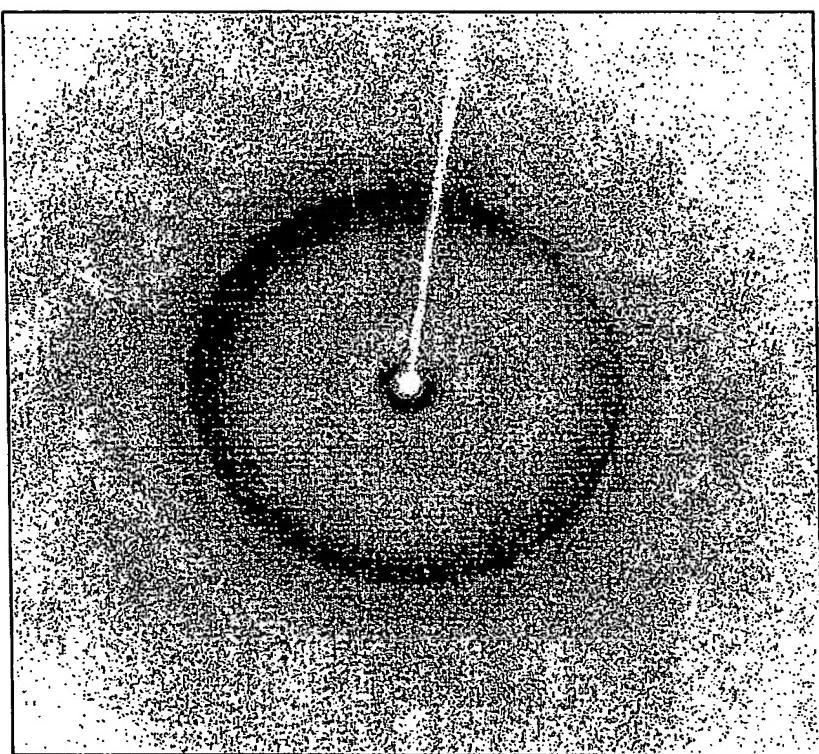
10/533611

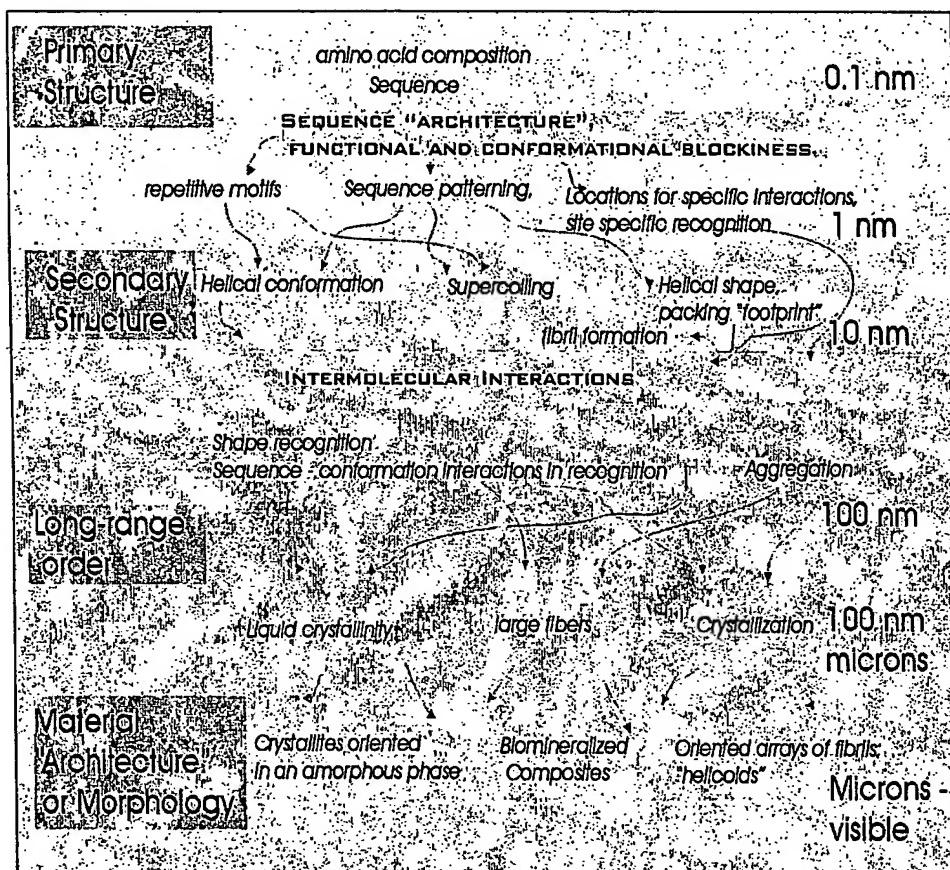
WO 2004/041845

PCT/US2003/034684

19/33

**Figure 19**



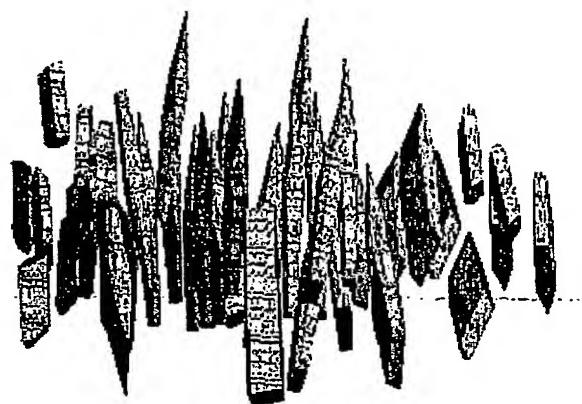
**Figure 20**

- Long homogeneous helical domains
- Not necessarily “folded”
- Polymorphic secondary structure
- Material formed by mesophase
- Structural role
- Extended fibers or fibrils
  - similar to synthetic polymers
  - can be polycrystalline, mineralized

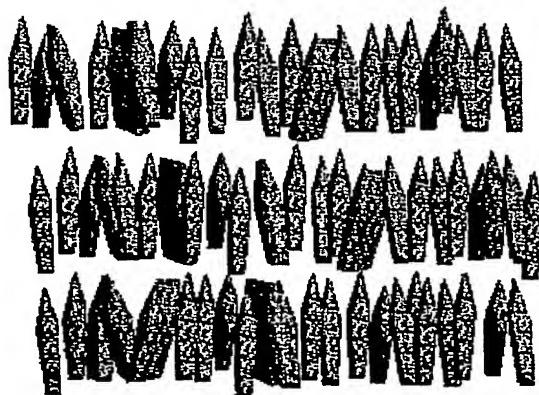
**Figure 21**

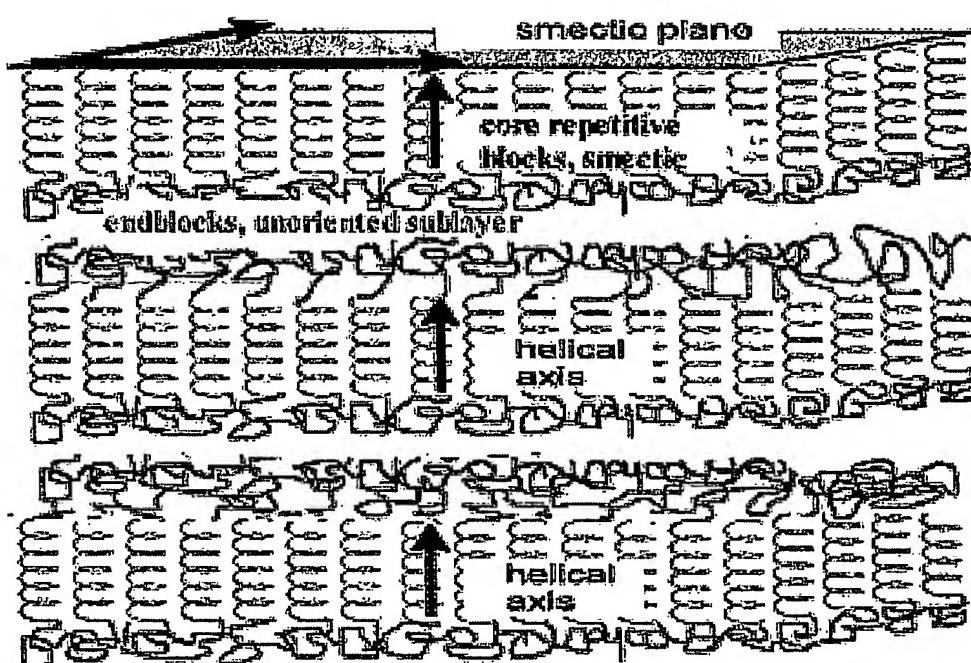
- “Liquid Crystal”
- Molecules anisotropic
- orientation, possibly some position

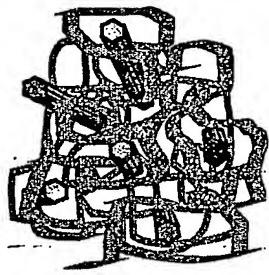
Chiral one dimensional liquid crystal



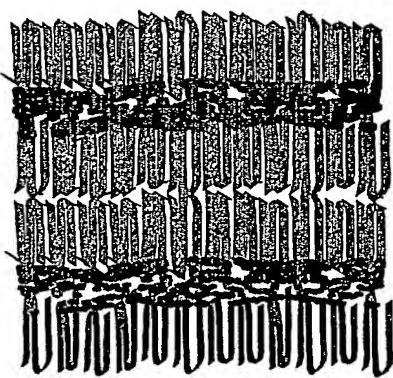
Two dimensional liquid crystals



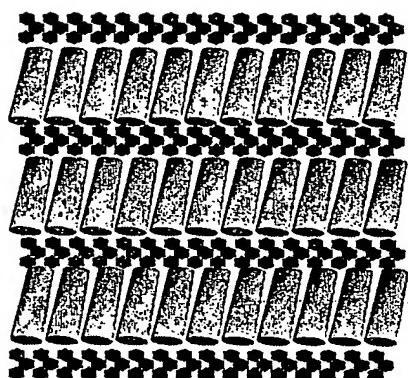
**Figure 22**

**Figure 23**

1. Nanocomposite - nanodomains of one phase separated by nanoscale domains of a second phase

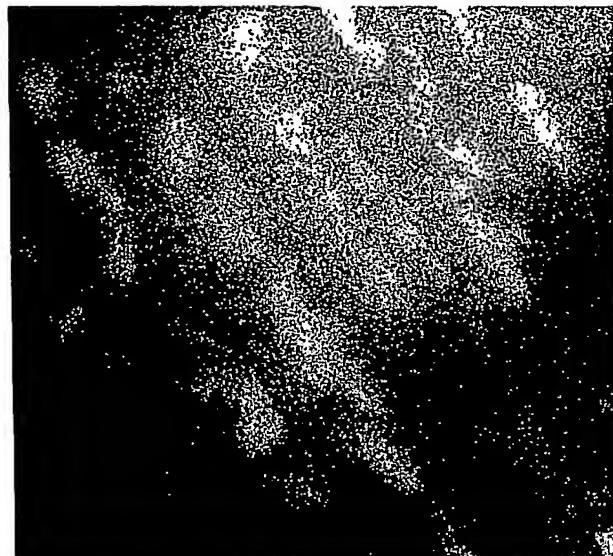
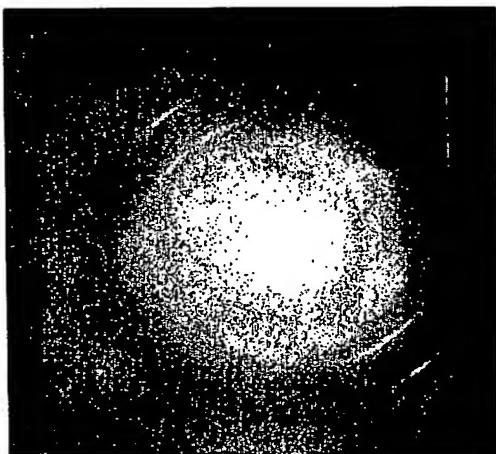
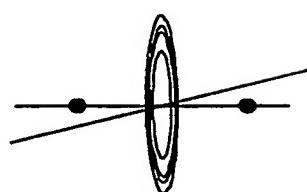


2. Simple Patterned Nanocomposite (from smectic layers)



3. "Cocrystal" - peptide phase crystallizes and/or inorganic phase crystallizes within layers

10 2004 041845

**Figure 24****Silkworm****Reciprocal Lattice for Cholesteric Film****Cholesteric Diffraction Pattern Expected**

10/533611

WO 2004/041845

PCT/US2003/034684

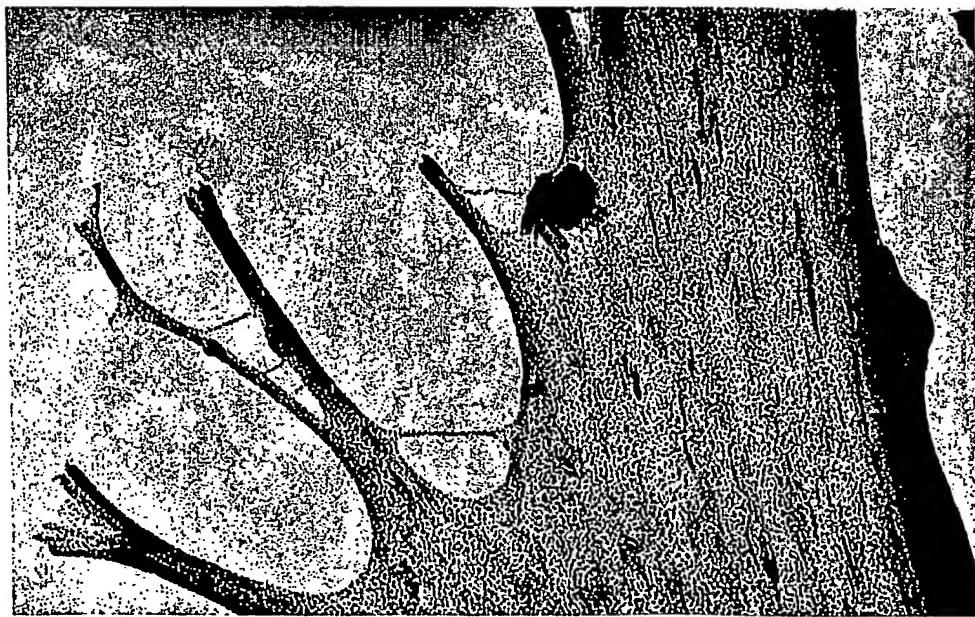
25/33

**Figure 25**

Peptide (GAGAGS) core

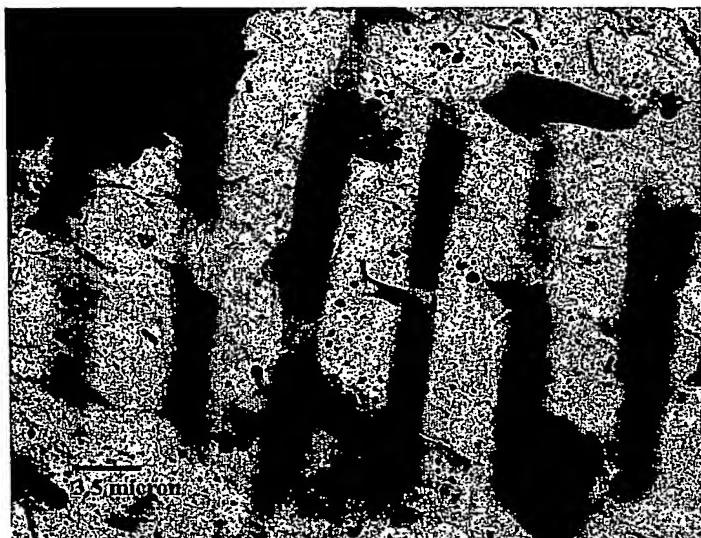


Met triggered Spider silk (biosynthetic)

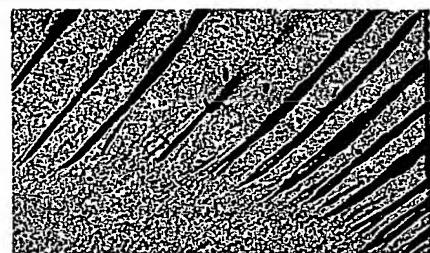


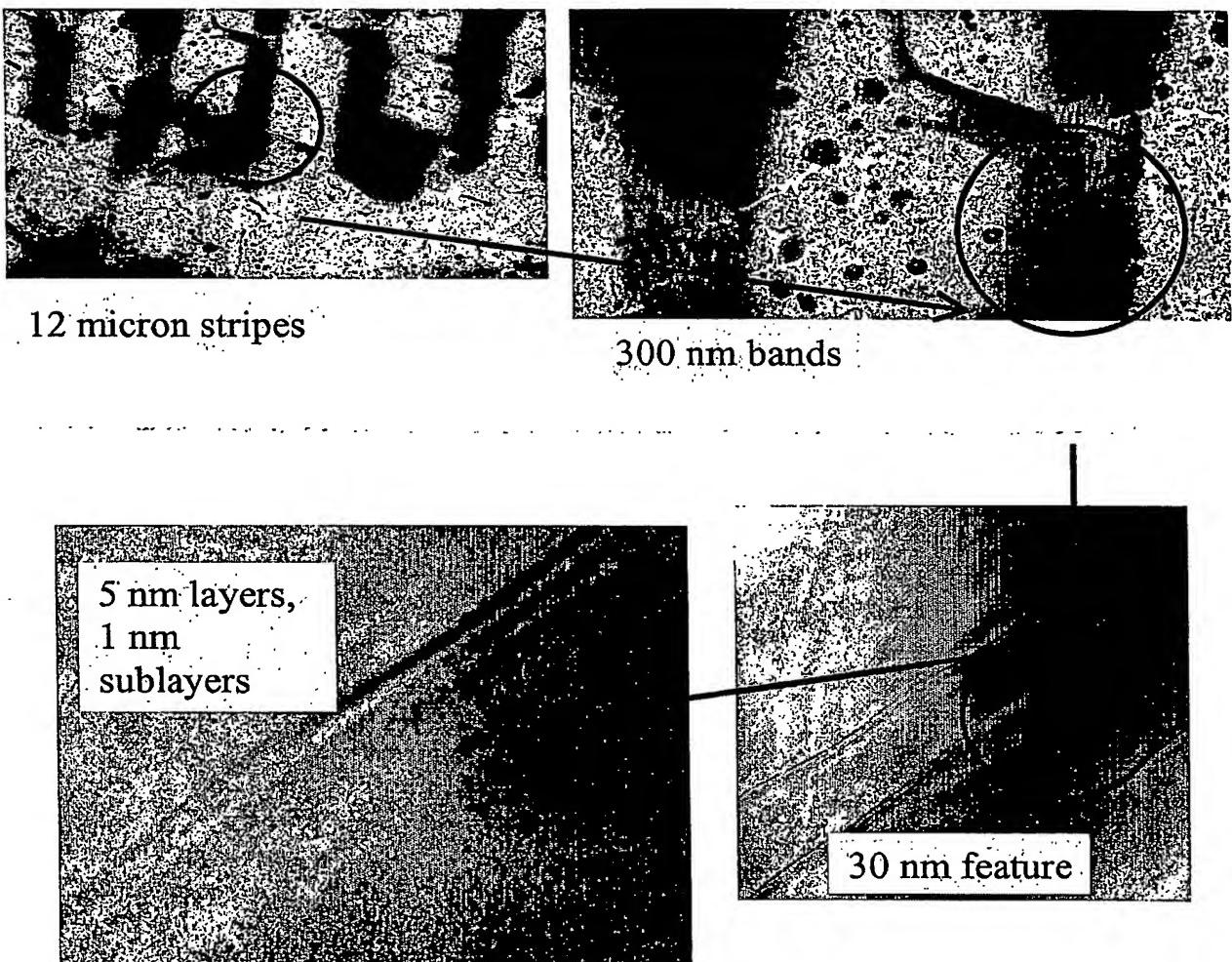
**Figure 26**

Peptides



Native Proteins (silks)



**Figure 27**

Air water interface from  
EDTA-Na aqueous solution of  
 $(\text{Glu})_5(\text{Gly}-\text{Asp}-\text{Val}-\text{Gly}-\text{Gly}-$   
 $\text{Ala}-\text{Gly}-\text{Ala}-\text{Thr}-\text{Gly}-\text{Gly}-$   
 $\text{Ser})_2(\text{Glu})_5$

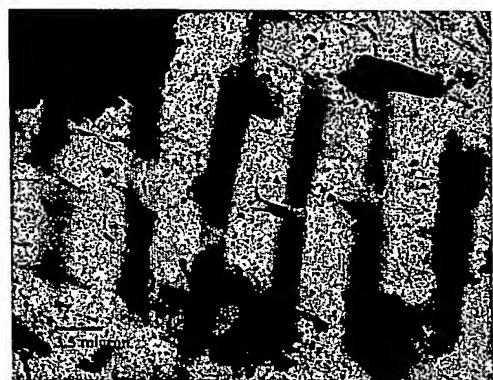
10/533611

WO 2004/041845

PCT/US2003/034684

28/33

Figure 28



10/533611

WO 2004/041845

PCT/US2003/034684

29/33

**Figure 29**

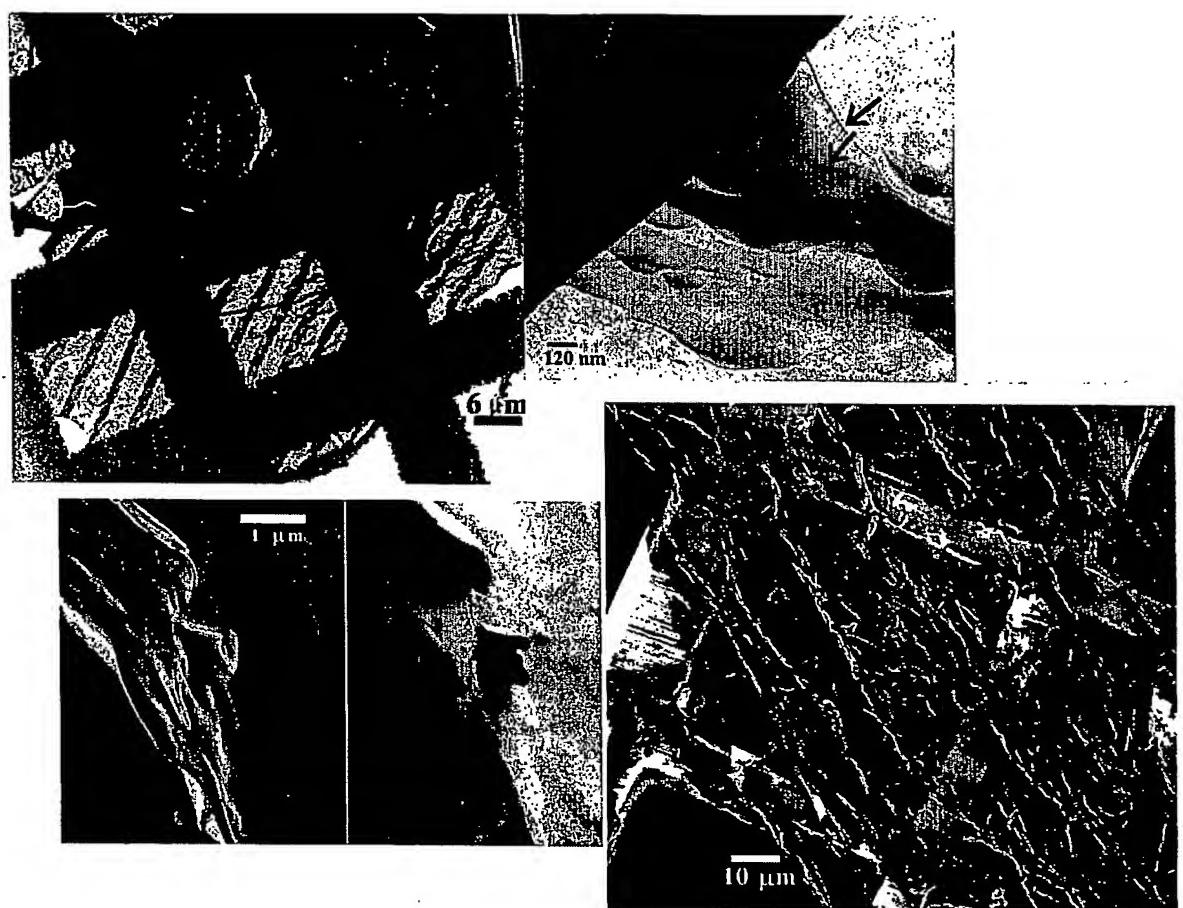
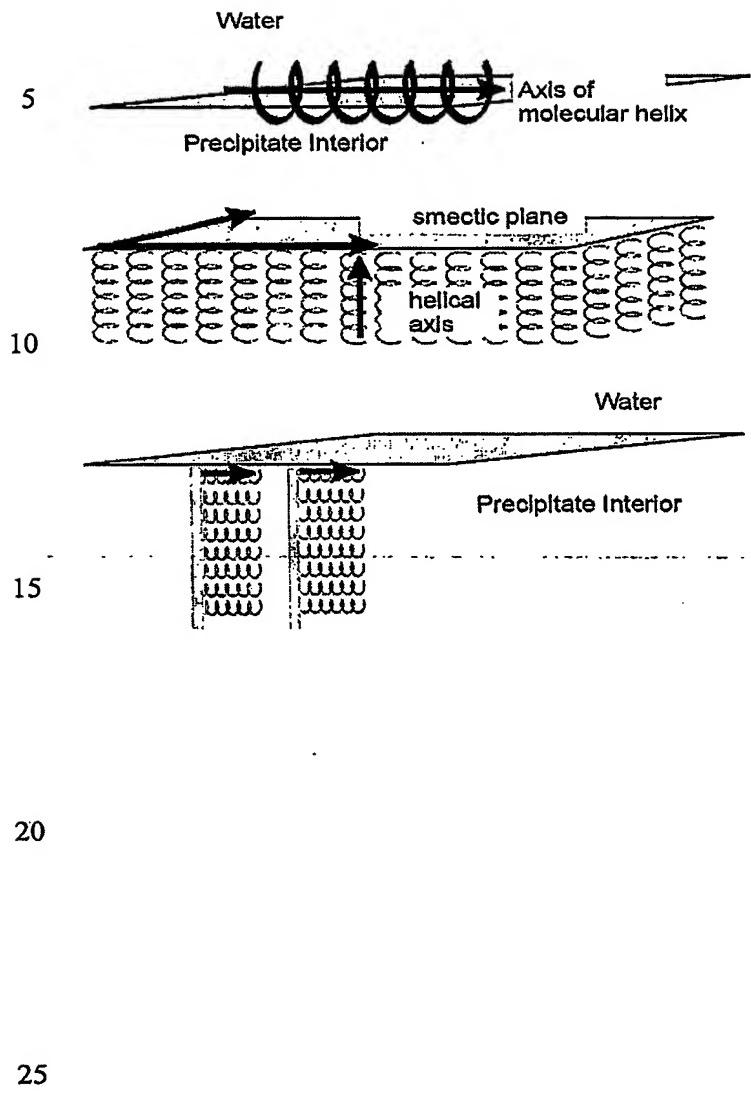
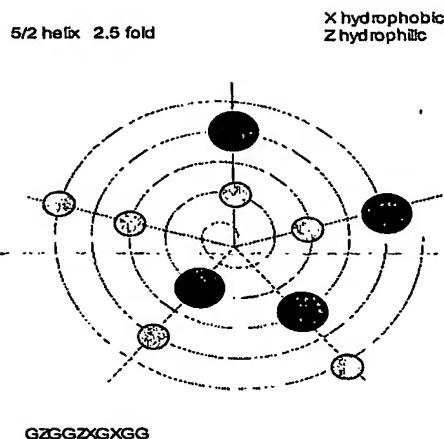


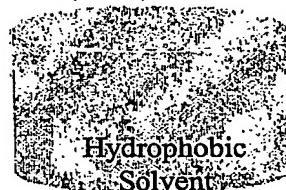
Figure 30



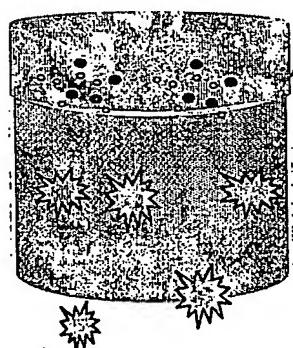
- A designed helix with a stronger hydrophobic/hydrophilic difference will be more readily stabilized and anchored parallel to the interface
- Helical axis is perpendicular to smectic layer plane
- Helices which tend to be parallel to interface and film result in layers more often normal to film

**Figure 31**

Glass or  
plastic



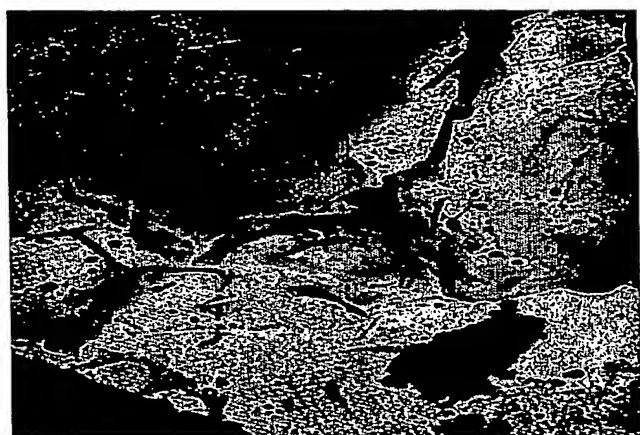
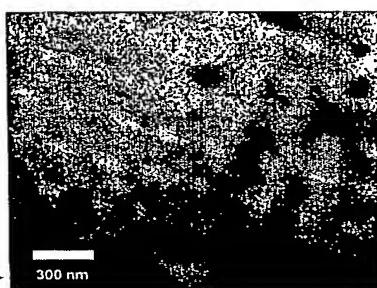
Interface –  
Molecules form  
Amphiphilic  
helix and orient



Protein or Peptide  
Molecules in  
Aqueous Solution

### Designed Amphiphilic Helix

- Glycine
- Hydrophilic
- Hydrophobic
- 
-

**Figure 32**

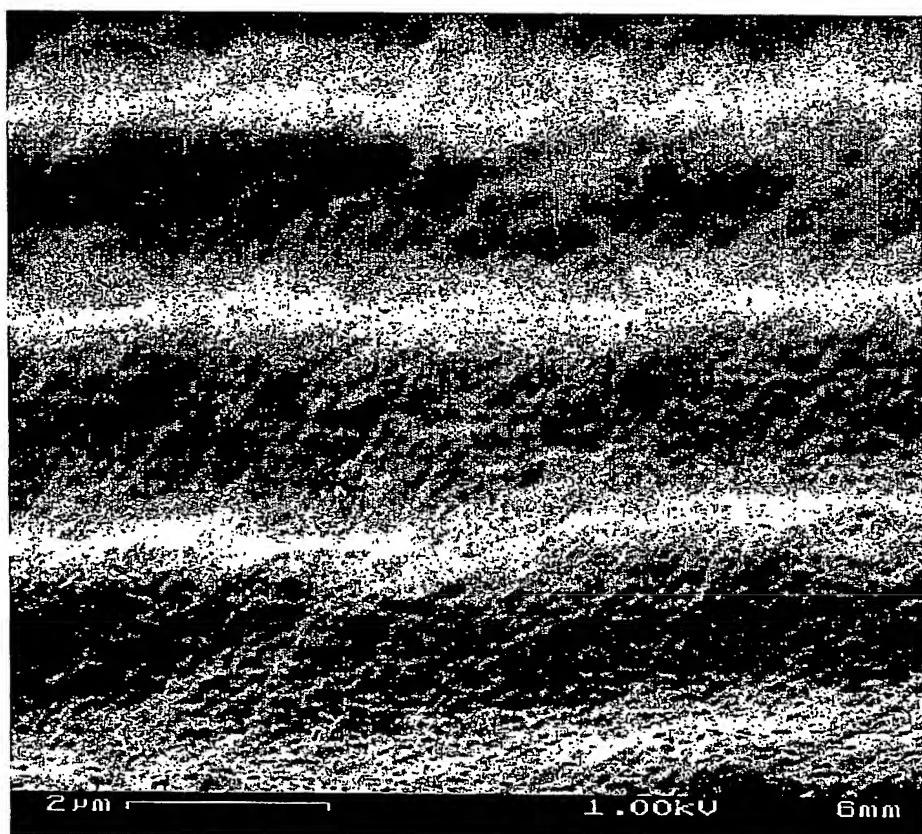
10/533611

PCT/US2003/034684

WO 2004/041845

33/33

Figure 33



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**